

CLAIMS

1. A personal cooling and heating system comprised of:
 - a vest;
 - at least one temperature sensor;
 - 5 a temperature transfer medium contained by the vest;
 - a cooling unit;
 - a heating unit;
 - a temperature transfer medium transport means;
 - the temperature transfer medium transport means being capable of
 - 10 transporting the temperature transfer medium from the vest into the cooling unit where the temperature transfer medium may be cooled by one or more cooling means and then once cooled the temperature transfer medium is transported back to the vest by the temperature transfer medium transport means;
 - the temperature transfer medium transport means being capable of
 - 15 transporting the temperature transfer medium from the vest into the heating unit where the temperature transfer medium may be heated by one or more heating means and then once heated the temperature transfer medium is transported back to the vest by the temperature transfer medium transport means;
 - a user adjustable electronic controller electrically attached to the
 - 20 temperature transfer medium transport means, the cooling means and the heating means;
 - the user adjustable electronic controller is electronically connected to the temperature sensor wherein the user adjustable electronic controller automatically and electrically activates the temperature transfer medium transport means when the
 - 25 temperature sensor electronically communicates to the user adjustable electronic controller that the vest is a temperature that is different than that of a user selected temperature setting on the user adjustable electronic controller thus causing the temperature transfer medium to be transported from the vest;
 - the user adjustable electronic controller automatically and electrically
 - 30 activates only the cooling means when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature thus causing the temperature transfer medium that has been transported from the vest to be cooled by the cooling means before being transported back to the vest by the temperature transfer medium transport means;
 - 35 the user adjustable electronic controller automatically and electrically activates only the heating means when the temperature sensor communicates to the

user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature thus causing the temperature transfer medium that has been transported from the vest to be heated by the heating means before being transported back to the vest by the temperature transfer medium transport means; and

5 a power supply means electrically attached to the adjustable electronic controller to provide the electrical power necessary for the adjustable electronic controller in communication with the temperature sensor to activate the temperature transfer medium transport means, and either the cooling means or the heating means.

2. The personal cooling and heating system of **CLAIM 1** wherein the
10 temperature transfer medium is water.

3. The personal cooling and heating system of **CLAIM 1** wherein the vest is further comprised of a flexible channel means capable of circulating therein the temperature transfer medium.

4. The personal cooling and heating system of **CLAIM 1** wherein the
15 cooling means is comprised of:

 at least one reversible thermoelectric cooler module electrically attached to and activated by a reversible direct current of electricity that is pulsed from the user adjustable electronic controller in one direction when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the
20 vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller;

25 the reversible thermoelectric cooler module having an electrically reversible hot side and an electrically reversible cold side which is reversed by the user adjustable electronic controller reversing the direction of the pulsed reversible direct current such that the electrically reversible hot side becomes the electrically reversible cold side and the electrically reversible cold side becomes the electrically reversible
30 hot side;

 at least one vest loop liquid heat exchanger attached to the temperature transfer medium transport means wherein when the temperature transfer medium transport means is activated the temperature transfer medium is pumped from the vest through the vest loop liquid heat exchanger and back to the vest;

35 the vest loop liquid heat exchanger having a front side and a back side either or both of which is formed by the electrically reversible cold side of the

reversible thermoelectric cooler module such that the temperature transfer medium makes direct contact with the electrically reversible cold side of the reversible thermoelectric cooler module when pumped through the vest loop liquid heat exchanger when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller such that the electrically reversible cold side of the reversible thermoelectric cooler module becomes the electrically reversible hot side of the reversible thermoelectric cooler module which remains in direct contact with the temperature transfer medium;

at least one air heat exchanger;

the air heat exchanger having at least one cooling liquid channel therein;

a cooling liquid contained in the air heat exchanger cooling liquid channel;

the air heat exchanger having at least one air channel there through;

at least one air heat exchanger fan attached to the air heat exchanger;

at least one cooling loop liquid heat exchanger;

at least one cooling loop pump means capable of pumping the cooling liquid from the cooling loop liquid heat exchanger to and through the air heat exchanger cooling liquid channel and then back to the cooling loop liquid heat exchanger;

the cooling loop pump means being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature

the cooling loop liquid heat exchanger having a cooling front side and a cooling back side either or both of which are formed by the electrically reversible hot side of the reversible thermoelectric cooler module, the electrically reversible cold side of which is used to form either or both of the front side or the back side of the vest loop liquid heat exchanger, such that the cooling liquid makes direct contact with the electrically reversible hot side of the reversible thermoelectric cooler module when pumped through the cooling loop liquid heat exchanger when the temperature sensor

communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature; and

the air heat exchanger fan being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature by electrically activating the air heat exchanger fan which blows ambient air through the air channel of the air heat exchanger that has been heated by the circulating of the cooling liquid therein and then discharging the now heated blown ambient air into the surrounding ambient air.

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10 5. The personal cooling and heating system of **CLAIM 4** wherein the heating means is comprised of:

at least one electric heating strip attached to the electrically reversible cold side of the reversible thermoelectric cooler module which is the electrically reversible cold side when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature.

15 6. The personal cooling and heating system of **CLAIM 1** wherein the cooling means is ice.

 7. The personal cooling and heating system of **CLAIM 1** wherein the cooling means is a refrigerant gas.

20 8. The personal cooling and heating system of **CLAIM 1** wherein the heating means is the combustion of a fuel.

 9. The personal cooling and heating system of **CLAIM 4** wherein the reversible thermoelectric cooler module is at least one Peltier device.

25 10. The personal cooling and heating system of **CLAIM 4** wherein the reversible thermoelectric cooler module is comprised of at least one Bismuth Telluride cube sandwiched between two ceramic plates.

 11. The personal cooling and heating system of **CLAIM 1** wherein the cooling unit, the cooling means, the heating unit, the heating means, the temperature transfer medium transport means and the power supply are attached to a carrier capable of being worn by a user thereby making the personal cooling and heating system portable.

30 12. The personal cooling and heating system of **CLAIM 1** wherein the temperature transfer medium transport means is functionally connected to the vest with a self sealing quick disconnect coupling.

35 13. The personal cooling and heating system of **CLAIM 1** wherein the

cooling unit, the cooling means, the heating unit, the heating means, the temperature transfer medium transport means, the power supply and the temperature sensor are all controlled by and in communication with the user adjustable electronic controller by wireless means.

5 14. The personal cooling and heating system of **CLAIM 1** wherein the cooling means is comprised of:

 at least one reversible thermoelectric cooler module electrically attached to and activated by a reversible direct current of electricity that is pulsed from the user adjustable electronic controller in one direction when the temperature sensor
10 communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of
15 electricity that is pulsed from the user adjustable electronic controller;

 the reversible thermoelectric cooler module having an electrically reversible hot side and an electrically reversible cold side which is reversed by the user adjustable electronic controller reversing the direction of the pulsed reversible direct current such that the electrically reversible hot side becomes the electrically reversible
20 cold side and the electrically reversible cold side becomes the electrically reversible hot side;

 at least one vest loop liquid heat exchanger attached to the temperature transfer medium transport means wherein when the temperature transfer medium transport means is activated the temperature transfer medium is pumped from the vest
25 through the vest loop liquid heat exchanger and back to the vest;

 the vest loop liquid heat exchanger having a front side and a back side either or both of which is formed by the electrically reversible cold side of the reversible thermoelectric cooler module such that the temperature transfer medium makes direct contact with the electrically reversible cold side of the reversible
30 thermoelectric cooler module when pumped through the vest loop liquid heat exchanger when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected
35 temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user

adjustable electronic controller such that the electrically reversible cold side of the reversible thermoelectric cooler module becomes the electrically reversible hot side of the reversible thermoelectric cooler module which remains in direct contact with the temperature transfer medium;

5 at least one cooling fin attached to the electrically reversible hot side of the reversible thermoelectric cooler module when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature; and

10 at least one cooling fin fan that is electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature thereby blowing ambient air over the cooling fin drawing heat therefrom and then discharging the now heated blown ambient air into the surrounding ambient air.

15 15. The personal cooling and heating system of **CLAIM 1** wherein the vest is comprised of:

 at least one liquid pack;
 the liquid pack having a liquid pack fluid contained therein;
 the liquid pack having a liquid pack cold side and a liquid pack hot
 20 side;

 at least one reversible thermoelectric cooler module electrically attached to and activated by a reversible direct current of electricity that is pulsed from the user adjustable electronic controller in one direction when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the
 25 vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller;

30 the reversible thermoelectric cooler module having an electrically reversible hot side and an electrically reversible cold side which is reversed by the user adjustable electronic controller reversing the direction of the pulsed reversible direct current such that the electrically reversible hot side becomes the electrically reversible cold side and the electrically reversible cold side becomes the electrically reversible
 35 hot side;

 the liquid pack hot side of the liquid pack being formed by the

electrically reversible cold side of the of the reversible thermoelectric cooler module such that the liquid pack fluid makes direct contact with the electrically reversible cold side of the reversible thermoelectric cooler module when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller such that the electrically reversible cold side of the reversible thermoelectric cooler module becomes the electrically reversible hot side of the reversible thermoelectric cooler module which remains in direct contact with the liquid pack fluid; and the cooling means of the personal cooling and heating system of **CLAIM 1** being further comprised of:

- at least one air heat exchanger;
- the air heat exchanger having at least one air channel there through;
- at least one air heat exchanger fan attached to the air heat exchanger;
- at least one cooling loop liquid heat exchanger;
- at least one cooling loop pump means capable of pumping the cooling liquid from the cooling loop liquid heat exchanger to and through the air heat exchanger cooling liquid channel and then back to the cooling loop liquid heat exchanger;
- the cooling loop pump means being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature;
- the cooling loop liquid heat exchanger having a cooling front side and a cooling back side either or both of which are formed by the electrically reversible hot side of the reversible thermoelectric cooler module, the electrically reversible cold side of which is used to form the liquid pack hot side of the liquid pack, such that the cooling liquid makes direct contact with the electrically reversible hot side of the reversible thermoelectric cooler module when pumped through the cooling loop liquid heat exchanger when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature; and
- the air heat exchanger fan being electrically attached to and activated

by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature by electrically activating the air heat exchanger fan which blows ambient air through the air channel of the air heat exchanger that has
 5 been heated by the circulating of the cooling liquid therein and then discharging the now heated blown ambient air into the surrounding ambient air.

16. The personal cooling and heating system of **CLAIM 15** wherein the heating means is comprised of:

at least one electric heating strip attached to the electrically reversible
 10 cold side of the reversible thermoelectric cooler module which is the electrically reversible cold side when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature.

17. The personal cooling and heating system of **CLAIM 1** wherein:
 15 the vest is further comprised of at least one vest air channel attached thereto;

the vest air channel having an input end and an output end;

at least one vest exhaust duct attached to the vest air channel output
 end;

20 at least one vest intake duct attached to the vest air channel input end;
 at least one vest air cooler and condenser attached to the vest exhaust duct;

at least one vest air fan capable of conveying air from the vest through
 the vest air channel, then through the output end, then through the vest exhaust duct
 25 then through the air cooler and condenser, then through the vest intake duct and then through the input end;

the vest air fan being electrically attached to and activated by the user
 adjustable electronic controller when the temperature sensor communicates to the user
 adjustable electronic controller that the temperature of the vest is higher than the user
 30 selected temperature;

the vest air cooler and condenser having at least one condensing coil
 over which the conveyed air passes when the vest air fan is activated;

the vest air cooler and condenser having at least one waste condensed
 fluid pump capable of pumping any waste condensed fluid that may be condensed
 35 from the conveyed air being passed over the vest air cooler and condenser;

a condenser fluid contained in the condensing coil;

at least one reversible thermoelectric cooler module electrically attached to and activated by a reversible direct current of electricity that is pulsed from the user adjustable electronic controller in one direction when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller;

the reversible thermoelectric cooler module having an electrically reversible hot side and an electrically reversible cold side which is reversed by the user adjustable electronic controller reversing the direction of the pulsed reversible direct current such that the electrically reversible hot side becomes the electrically reversible cold side and the electrically reversible cold side becomes the electrically reversible hot side;

at least one condenser loop liquid heat exchanger;

at least one condenser fluid pump attached to the condenser loop liquid heat exchanger;

the condenser fluid pump being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature such that when the condenser fluid pump is activated the condenser fluid is pumped from the condensing coil through the condenser loop liquid heat exchanger and then back to the condensing coil;

the condenser loop liquid heat exchanger having a front side and a back side either or both of which is formed by the electrically reversible cold side of the reversible thermoelectric cooler module such that the condenser fluid makes direct contact with the electrically reversible cold side of the reversible thermoelectric cooler module when pumped through the condenser loop liquid heat exchanger when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature and in the event that the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is lower than the user selected temperature the user adjustable electronic controller automatically reverses the direction of the reversible direct current of electricity that is pulsed from the user adjustable electronic controller such that the electrically reversible cold side of the reversible thermoelectric cooler

module becomes the electrically reversible hot side of the reversible thermoelectric cooler module which remains in direct contact with the condenser fluid;

at least one air heat exchanger;

the air heat exchanger having at least one cooling liquid channel

5 therein;

a cooling liquid contained in the air heat exchanger cooling liquid channel;

the air heat exchanger having at least one air channel there through;

at least one air heat exchanger fan attached to the air heat exchanger;

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at least one cooling loop liquid heat exchanger;

at least one cooling loop pump means capable of pumping the cooling liquid from the cooling loop liquid heat exchanger to and through the air heat exchanger cooling liquid channel and then back to the cooling loop liquid heat exchanger;

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the cooling loop pump means being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature

20 the cooling loop liquid heat exchanger having a cooling front side and a cooling back side either or both of which are formed by the electrically reversible hot side of the reversible thermoelectric cooler module, the electrically reversible cold side of which is used to form either or both of the front side or the back side of the condenser loop liquid heat exchanger, such that the cooling liquid makes direct contact with the electrically reversible hot side of the reversible thermoelectric cooler module when pumped through the cooling loop liquid heat exchanger when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature; and

25 the air heat exchanger fan being electrically attached to and activated by the user adjustable electronic controller when the temperature sensor communicates to the user adjustable electronic controller that the temperature of the vest is higher than the user selected temperature by electrically activating the air heat exchanger fan which blows ambient air through the air channel of the air heat exchanger that has been heated by the circulating of the cooling liquid therein and then discharging the now heated blown ambient air into the surrounding ambient air.

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18. The personal cooling and heating system of **CLAIM 17** wherein the vest, the vest air cooler and condenser, the vest air fan, the vest intake duct and the

vest exhaust duct are contained in a protective suit capable of being worn by a user wherein the intake duct discharges the conveyed air that was passed over the vest air cooler and condenser into the protective suit which conveyed air in turn is drawn into the input end of the vest air channel by the action of the vest air fan.

5 19. The personal cooling and heating system of **CLAIM 16** wherein the heating means is comprised of:

 at least one electric heating strip attached to the electrically reversible cold side of the reversible thermoelectric cooler module which is the electrically reversible cold side when the temperature sensor communicates to the user adjustable
10 electronic controller that the temperature of the vest is lower than the user selected temperature.

 20. A personal cooling and heating system according to **CLAIMS 2,3,4,5,6,7,8,9,10, 12,13,14,15,16,17,18 or 19** in which the cooling unit, the cooling means, the heating unit, the heating means, the temperature transfer medium transport
15 means and the power supply are attached to a carrier capable of being worn by a user thereby making the personal cooling and heating system portable.